Chapter 4 SELF-ASSESSMENT

Select the letter of the best answer below.

1. K/U If an ionic compound has small ions, then it will likely have
- **a.** a low melting point and low solubility.
- **b.** a high melting point and high solubility.
- **c.** a low melting point and high solubility.
- **d.** a high melting point and low solubility.
- **e.** There is not enough information provided to answer correctly.

2. K/U The difference between a mostly covalent bond and a polar covalent bond is that
- **a.** a polar covalent bond has a north and a south pole.
- **b.** the electron bond pair of a covalent bond is shared more or less equally.
- **c.** a polar covalent bond exists when the ΔEN is greater than 1.7 but less than 3.3.
- **d.** Two of the above are correct.
- **e.** All are correct.

3. K/U Helium behaves like a noble gas because
- **a.** its valence shell is completely filled.
- **b.** its outermost orbital is completely filled.
- **c.** its outermost energy level is completely filled.
- **d.** Two of the above are correct.
- **e.** All are correct.

For Questions 4 to 6, choose from the following electron group arrangements:

- **a.** linear
- **b.** trigonal planar
- **c.** tetrahedral
- **d.** trigonal bipyramidal
- **e.** octahedral

4. K/U 4 bonding pairs, 2 lone pairs

5. K/U 120° bond angles

6. K/U $ClBr_2(g)$

7. K/U Which of the following bonds is the most polar?
- **a.** C–O
- **b.** Si–O
- **c.** C–Cl
- **d.** C–Br
- **e.** C–C

8. T/I Which of the following compounds does not have a bent molecular shape?
- **a.** $CO_2(g)$
- **b.** $H_2S(g)$
- **c.** $H_2O(\ell)$
- **d.** $SeH_2(g)$
- **e.** $XeCl_2(s)$

9. K/U Which type of hybridization is most likely to have occurred for the central atom in phosphorus pentachloride, $PCl_5(s)$?
- **a.** sp^3d^2
- **b.** sp^3d
- **c.** sp^3
- **d.** sp^2
- **e.** sp

10. T/I Which of the following compounds is non-polar?
- **a.** $H_2S(g)$
- **b.** $BrCl_3(\ell)$
- **c.** $SiH_3Cl(s)$
- **d.** $AsH_3(g)$
- **e.** $CCl_4(g)$

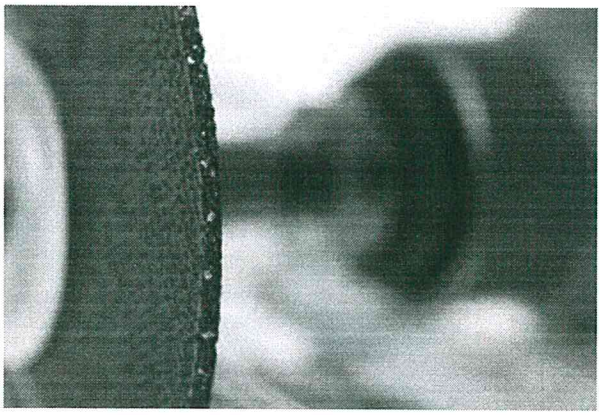
Use sentences and diagrams as appropriate to answer the questions below.

11. T/I Which compounds are not likely to occur (there can be more than one answer): CaKr, Na_2S, $BaCl_3$, MgF_2, PCl_5, NCl_5? Explain your choices.

12. A An unknown compound is a white solid at room temperature. It dissolves in water and is able to conduct an electric current in solution.
- **a.** Is this compound likely to contain ionic or covalent bonds? Explain your answer.
- **b.** Think of one common household substance that fits the description of the unknown compound.

13. C Use orbital diagrams to show how carbon and chlorine would bond. Write the chemical formula for the compound that forms.

14. T/I Which compound in each of the following pairs would have the higher melting point?
    a. CaO(s) or KI(s)
    b. KCl(s) or KBr(s)
    c. RbCl(s) or SrCl(s)
15. T/I Classify the following bonds as mostly ionic, polar covalent, or mostly covalent by calculating the difference in their electronegativity values.
    a. Mg–Cl
    b. Na–F
    c. Al–I
    d. O–O
16. K/U Briefly explain the term *co-ordinate covalent bond* and give an example to help illustrate your explanation. Include a diagram of your example.
17. T/I Determine which of the following molecules would be expected to dissolve in water. Explain your answers.
    a. ClF(g)
    b. $NCl_3(\ell)$
    c. $CH_3Cl(g)$
    d. $BF_3(g)$
    e. $CS_2(\ell)$
18. T/I Oxygen can form compounds with every Period 3 element except argon. Determine which would be ionic or covalent compounds, and draw Lewis diagrams to represent each one.
19. K/U Define *electronegativity, electron density,* and *bond dipole.*
20. T/I Use the terms in question 19 to describe a polar covalent bond that forms between hydrogen and chlorine.
21. T/I Use VSEPR theory to predict the shape of the following molecules and polyatomic ions:
    a. NF_3
    b. SO_3
    c. I_3^-
    d. SCl_5F
22. T/I Which molecules in question 22 would have a dipole? Explain your answer.
23. A Explain why $C_{20}H_{40}$ is a solid at room temperature, whereas C_2H_4 is a gas.
24. A Use your knowledge of the properties of compounds to predict the results of these two investigations.
    a. At $t = 0$ min, two clear and colourless liquids were combined in a beaker at room temperature. After 30 min, there were two distinct phases in the beaker: a clear, colourless liquid at the top and a white solid at the bottom. Explain what types of substances were likely inside each liquid at $t = 0$ min, and what information led you to that conclusion.
    b. At $t = 0$ min, two clear and colourless liquids were combined in a beaker at room temperature. After 30 min, there were two distinct phases in the beaker: each a clear and colourless liquid. Explain what types of substances were likely inside each liquid at $t = 0$ min.
25. A Diamond-encrusted sawblades are used to cut through very hard materials, because diamond is one of the hardest materials known. What is used to cut diamonds? Research your answer by asking a gemologist or a tool manufacturer.



Self-Check

If you missed question ...	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Review section(s)...	4.1	4.1	4.1	4.2	4.2	4.2	4.1	4.2	4.2	4.1	4.1	4.1	4.2	4.1	4.1	4.2	4.1	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.1